TWO CASES OF BRAIN TUMOR.

(1) TUMOR OF THE SECOND FRONTAL GYRE; (2) TUMOR OF THE OPTIC THALAMUS. REMARKS ON THE LOCALIZATION OF OCULO-MOTOR AND FACIAL CENTRES.

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THE specimens herewith presented are of unusual interest from several points of view. If the symptoms exhibited by the patient from whom the first specimen was taken were due to the only lesion which I was able to find, the case is unique, as it shows oculomotor paresis and upper facial paralysis apparently due to a cortical lesion, or to a lesion conjointly of the frontal cortex and centrum ovale. The patient from whom the second specimen was removed had also marked paralysis in the upper distribution of the facial nerve as well as the lower, and this was associated with hemiplegia and some hemianæsthesia of the same side.

CASE I.—*Tumor of the Second Frontal Gyre.* W. V., æt. 16 years, male, was admitted to the Philadelphia Hospital about two weeks before his death. His mother died of heart disease; his father is living, and is a hard drinker. He had two sisters and one brother, who are healthy; another brother, however, died in infancy of hydrocephalus. He had measles and scarlet fever about eight years ago, and dropsy followed the latter. He had been compelled to work beyond his strength for years. He had had occasional convulsions for over a year, and thought that he had received a blow on the head before they came on. He had a scar about an inch long in the scalp on the right side

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[1] Read before the Pathological Society of Philadelphia.

of the head, but it seemed to be superficial; no depression or cleavage of bone could be made out.

On or about December 27th, 1886,[1] in trying to rise from his chair, he fell. He had noises in his head, or, as he expressed it, "his head moaned." He also had vomiting at this time, and obstinate constipation; and sound and light were intensified by the pain in his head. He had some fever, and his pulse was sometimes as low as fifty to the minute. The next day, there was some loss of power, and he walked with a staggering gait; he had headache and cold sweats. On the third day, he had diplopia, vertigo, and palpitation; and he now cried out with severe pain in his head, and could retain nothing on his stomach. He also had seizures, the nature of which could not be determined. These got somewhat better, but were followed by sensations of pins and needles in the arms, accompanied with great stiffness. His bowels continued to be much constipated. In the second week of his illness, he lost power, to some extent, in his left arm, and had some depression of sensation in the right. Although during this week he seemed to be stronger, on attempting to walk he staggered and fell. He had intolerance of light all the time, especially marked in the right eye. During his fits, he was drawn to the left side, and always cried out before they came on. He had sensations of choking during the fits, and said that he was never unconscious in them. He was ravenously hungry most of the time during his illness after the first week, and bolted his food at all times.

His temperature on admission was 99°, and afterward ranged between 98° and 99°. He had attacks of vomiting at irregular periods, and his bowels were much constipated, but readily moved by enemata. His eyes were somewhat immobile, making his gaze seem fixed. His pupils were equal. He had a slight but distinct ptosis of the right eye, sometimes more marked than at other times. He could not close the left eye, nor wrinkle the left forehead. He had distinct loss of power in the left arm and hand, and also in the left leg, but not so marked. He died apparently from general exhaustion.

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[1] During the early part of his illness, he was attended by Dr. E. H. Speer, of Philadelphia, who kindly sent me some notes of his case.

Autopsy.—The body was that of an emaciated boy; there were several scars on the head. Slight adhesions of the pleura were found over the upper portion of the right lung; the lungs were otherwise normal. The heart, kidneys, and liver were normal. The intestines and spleen were not examined.

The dura mater was not adherent to the skull, but, on attempting to remove it, the right side was found to be strongly adherent to the pia mater and the brain underneath it over the antero-frontal region, and the corresponding portion of the median surface of the right hemisphere. In removing the brain, a little serous or grumous fluid exuded from this region, but no true pus. On carefully removing the dura, a reddish-gray grumous mass was found adherent to the agglutinated dura and pia mater, and involving the gray matter of the brain and a portion of the white matter immediately adjacent. This was soft, and in its centre a hole or cyst appeared, or the space had been occupied by tissue now broken down. The exact location and dimensions of this mass were as follows: It was almost entirely confined to the posterior portion of the second frontal gyre (of Ecker), encroaching very slightly at its posterior and lower part upon the lower third of the ascending frontal gyre. Its greatest dimension was, diagonally from below upward and forward, three and a half inches. Perpendicularly, the broken-down mass extended two and a half inches, and also two and a half inches antero-posteriorly. It involved the white matter of the second frontal gyre, and to some extent that of the first and adjacent portion of the third. The ganglia and capsules proper were not involved. There were some meningeal congestion and inflammation continuous from the mass.

The existence of ptosis of one side, and of paralysis of the upper fibres of the facial nerve of the other, with paresis of the arm and leg of this side, led me to infer that the case was one of more or less diffused meningitis, with exudation of the base. It looked as if the facial and oculomotor nerves of opposite sides, at their superficial origins, had been more or less involved in some process causing pressure to be exerted upon them, and that the descending motor tracts were so affected as to produce paresis of arm and leg. The most careful scrutiny of the base, examining one nerve after another at its origin, and as far as possible along its course, revealed nothing, and it is reasonable to infer that the symptoms present were due to the only lesion discovered, namely, the tumor involving the posterior part of the second frontal gyre, a small portion of the ascending frontal gyre, and the adjacent white matter. It is not my purpose to go into any lengthy comments upon the case, but rather to submit it as a clinico-pathological contribution to the study of localization, to be used by others or myself at some future time. It is unfortunate that no ophthalmoscopic examination was made in this case. Arrangements were made to examine the eyes carefully with the ophthalmoscope, but, through a combination of unfortunate circumstances, it was not done.

According to Ferrier,[1] at the base of the first frontal and extending partly into the second frontal gyre in the brain of the monkey is an area, irritation of which causes elevation of the eyelids, dilatation of the pupils, conjugate deviation of the eyes, and turning of the head to the opposite side. If the stimulation is faint, elevation of the eyelids is the only observable effect. The same authority says that certain clinical facts seem to require the existence of a distinct centre for the levator palpebræ superioris, inasmuch as paralysis may occur limited to this muscle without affecting the other muscles supplied by the third nerve. Ferrier opposes the view of Landouzy that the centre for the levator palpebræ superioris is situated in the angular gyre, holding that, as ptosis does not necessarily accompany lesion of the angular gyre, no causal relationship can be considered as established between the two. He holds that, if the distinct volitional centre for the levator palpebræ superioris is in the human brain, it must be sought for in the region constituted by the bases of the first and second frontal gyres.

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[1] Localization of Cerebral Disease, p. 38.

"There are, however," he says, "difficulties in the way, for lesions of this region are not uncommon, whereas isolated affection of the levator palpebræ is a comparatively rare occurrence, or at least has not been so obvious as to call for remark. This absence of paresis or paralysis, therefore, requires explanation. It seems to me not improbable that the intimate bilateral association of the oculo-motor nuclei may account for this, and that the escape of the levator palpebræ from paralysis, in cases of unilateral lesion, is simply a higher degree of that which is seen in the orbicularis oculi in facial paralysis of cerebral origin."

It will be noticed in this case that the ptosis was on the same side as the lesion. If not conjugate deviation, there was, at least, some immobility of the eyes. Diplopia also was present for a time. The patient seemed sometimes to have slight right internal squint.

CASE II.—*Tumor of the Optic Thalamus.*—D. M., æt. 19, white, was born in Philadelphia. His father died of bronchitis at the age of 39. He was wild and wayward, not living at home. He was bitten by a horse in the hand during the latter part of June, 1886, and was paralyzed about a week after he was bitten. He was sweeping a store, when he suddenly fell, and on rising, in about five minutes found his right side somewhat paralyzed. He complained of much tenderness over the bowels. He did not suffer with headache before, but his head ached persistently after this time, the pain being most marked over the left eye and round the left temple, though it extended more or less over the whole head.

He had a slight cough, which was worse in the morning, with some muco-purulent expectoration. He had prolonged expiration with crackling râles at the left apex, with a slight impairment of resonance. His right lung was normal. The heart sounds were nearly normal, although the second was somewhat accentuated, and the first slightly muffled. He suffered from anorexia and frequent vomiting.

When first examined, his face was drawn markedly to the left side; he could not wrinkle the right forehead, and there was lagophthalmos of this side. He could not raise his right arm to a level with his shoulder, and was unable to walk well because of paralysis of the right leg. Later, the hemiplegia became profound. He had a blotchy, irregular, erythematous and papular eruption over his chest. His hair had fallen out considerably. The æsthesiometer showed some loss of sensation in the right limbs.

Jan. 18th, 1887.—His pupils were irregular, the left contracted. He was very dull in the mornings and had delusions. His headache was not so severe as before.

19th.—He was considerably brighter. Iodoform ointment was rubbed over the nape of the neck, and three grains given internally. Some improvement was noted in the morning. The external rectus of the right eye was paralyzed. His eyes were bloodshot and his tongue coated. He had no delirium and he took nourishment well.

20th.—His pulse was very rapid, about 160. He complained of much pain in the back of his neck, especially if he moved. He had some difficulty in swallowing. He died on the 21st. His temperature record from January 11th to January 21st most of the time ranged between 97.5° and 100.5°, oscillating irregularly.

Autopsy (made by Dr. Wm. Osler). His body was that of a poorly nourished lad. There were adhesions of the left pleura. The heart was of average size; on the right side the tricuspid ring was wide and would admit three fingers and a thumb. On the left side the mitral valve was normal, and the aortic was much fenestrated; the fenestrations were large; there were numerous small vegetations. The aorta was smooth. The lungs had a cavity at the left apex. Throughout the upper lobe were numerous caseous masses. In the lower lobe were numerous nodular groups of tubercles. The right lung was crepitant throughout, and presented numerous scattered groups of tubercles. The bronchial glands were slightly enlarged, containing caseous and calcareous masses. The abdominal organs were normal. The dura mater was normal. At the base of the brain the membranes were clear. A little thickening and matting of the membranes were noticeable in the Sylvian fissure, and on full exposure were seen in the pia, covering the convolutions of the island, numerous gray granulations. The ventricles were found much dilated. The amount of fluid was excessive. The septum and fornix were almost diffluent. The posterior cornu was especially dilated. On the left side the thalamus was occupied by a large mass, which projected on the floor of the ventricle, covered by the velum, which was thin and stretched over it. The mass seemed to project from the inner portions of the left thalamus and pushed away the outer part and the caudate nucleus. The mass was grayish-red in color, very regular on the surface, and very firm. It projected forward to within a short distance of the head of the caudate nucleus. A section through the anterior portion of the tumor showed that it had pushed aside the thalamus, and appeared to occupy a portion of its inner half. The gray matter in its vicinity, as well as the internal capsule, was infiltrated and œdematous. On section of the left hemisphere the ganglia seemed normal. On further examination, a few tubercles were found in the anterior perforated space.

One point of interest in connection with this case is the same as one presented by the first case, namely, the existence of complete facial paralysis in association with hemiplegia. The muscles in the distribution of the upper fibres of the facial nerve, namely, the frontalis, orbicularis palpebrarum, etc., were profoundly paralyzed. Commonly, as is well known, in hemiplegia from cerebral lesions—from lesion anywhere above the pons—the upper face escapes, or, if paralyzed at first, promptly regains power. Out of the multitude of hemiplegics, therefore, we have few instances of upper facial paralysis associated with helplessness of the arm and leg of the same side, although the lower portion of the face is usually affected to a greater or less extent. I have, however, seen several cases in which paralysis of the arm, leg, and the entire face on the same side were present. Some of those cases are on record; a few were cellected by Dr. Lloyd and myself, and are to be found in the article on "Tumors on the Brain and its Envelopes," in the "System of Practical Medicine by American Authors," edited by Dr. Wm. Pepper.

The following remarks occur in a paper presented by me to this Society January 23d, 1879 (in this paper was described a case of tumor of the brain situated just in front of the optic chiasm): "A few cases are on record in which the upper fibres of the facial nerve have been paralyzed, as the result of a lesion situated in the brain, above the pons and cerebral peduncles. Chvostek, quoted by Nothnagel (Ziemssen's "Cyclopedia," vol. xii., p. 118), describes a case in which disturbances of speech and a feebleness of the extremities of the left side, present at first, disappeared almost entirely after a few days; on the other hand, the left facial nerve remained almost completely paralyzed (even the branch to the orbicularis palpebrarum), and the autopsy disclosed the presence of a hemorrhagic cyst in the right nucleus lenticularis. The following explanation of the cases of this kind is given by Nothnagel (*op. cit.*, p. 147):

"'When the tract of the nerve fibres passing along the base of the nucleus lenticularis, designated as the *ansa peduncularis* (Hirnschenkelschlinge, Gratiolet, Meynert), is involved in the lesion, the character of the symptoms is somewhat different from that described. The most noticeable difference seems to be that in this case the fibres of the facial nerve supplying the frontalis and the orbicularis palpebrarum, which otherwise escape, are paralyzed with the rest, as in the instance reported by Huguenin.'"

In the present case the upper facial paralysis is probably to be explained, not from the situation of the tumor in the thalamus, but either from the pressure exerted by it, or the inflammation and œdema adjacent to it, or from both conjointly. In this indirect way both the capsule and lenticular nucleus were involved.

The paralysis of the upper face in the first case must be explained differently. If due to the cortical lesion, the tumor or cyst probably destroyed either the centres for the movements of the eye and forehead, or the white matter constituting the tracts which connect the centres with the parts below. It will be remembered that the lower third of the anterior central or ascending frontal gyre was infringed upon, and that the destruction of white matter extended somewhat beyond the second frontal gyre.

It has occurred to me that the persistence of both the ptosis of one side, and the paralysis in the upper distribution of the facial nerve on the other side, may be explained each from the other. It is supposed that upper facial paralysis and oculo-motor paralysis of cortical origin do not persist, as already stated in quoting Ferrier, because of the intimate bilateral association of the oculo-motor and of the facial nuclei. In this case, supposing the ptosis to have been due to the cortical lesion on the same side, and the facial paralysis of the other side to the same lesion, a curious disassociation was produced, and hence the unilateral symptom in each case persisted.